

Extracellular Matrix Bioscaffold Augmented with Human Stem Cells for Cardiovascular Repair

Grant Award Details

Extracellular Matrix Bioscaffold Augmented with Human Stem Cells for Cardiovascular Repair

Grant Type: Early Translational III

Grant Number: TR3-05626

Project Objective: The goal of this Development Candidate project is to generate a mesenchymal stromal cell (MSC)-seeded small intestinal submucosa (SIS) decellularized extracellular matrix (ECM) device for the treatment of chronic myocardial ischemia (CMI).

Investigator:

Name: Walter Boyd

Institution: University of California, Davis

Type: PI

Disease Focus: Heart Disease

Human Stem Cell Use: Adult Stem Cell

Award Value: \$4,631,754

Status: Closed

Progress Reports

Reporting Period: Year 1

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Reporting Period: Year 2

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Reporting Period: Year 3

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Grant Application Details

Application Title: Extracellular Matrix Bioscaffold Augmented with Human Stem Cells for Cardiovascular Repair

Public Abstract: An estimated 16.3 million Americans suffer from coronary heart disease. Every 25 seconds, someone has a coronary event and every minute, someone dies from one. Treatment for coronary heart disease has improved greatly in recent years, yet 1 in 6 deaths in the US in 2007 was still caused by this terrible disease. Stem cells have been used as an supplemental form of treatment but they have been most effective for patients treated immediately after their first heart attack. Unfortunately, stem cell therapy for chronic heart disease and heart failure has been less successful. With current delivery methods for stem cells into the heart, most are washed away quickly, whereas our device will hold them in the area that needs repair. With this project we are testing a novel approach to improve the benefits of stem cell therapy for patients suffering from chronic heart disease. By applying a type of bone marrow stem cells known to enhance tissue repair (mesenchymal stem cells) to a biological scaffold, we hope to greatly amplify the beneficial properties of both the stem cells and the biological scaffold. This device will be implanted onto an appropriate preclinical model that have been treated so as to mirror the chronic heart disease seen in humans. We predict that this novel device will heal the damaged heart and improve its function to pave the way for a superior treatment option for the thousands of Americans for whom the unlikely prospect of a heart transplant is currently the only hope.

Statement of Benefit to California: Heart disease is the number one cause of death and disability in California and in the US as a whole. An estimated 16.3 million Americans over the age of 20 suffer from coronary heart disease (CHD) with an estimated associated cost of \$177.5 billion and CHD accounted for 1 in 6 deaths in the US in 2007. Advances in treatment have decreased early mortality but consequently lead to an increase in the incidences of heart failure (HF). Patients with HF have a 50 percent readmission rate within six months, which is a heavy cost both in terms of quality of life and finances. The high cost of caring for patients with HF results primarily from frequent hospital readmissions for exacerbations. The need for efficient treatment strategies that address the underlying cause, massive loss of functional myocardium, is yet to be met. We believe that present project proposal, development of a combined mesenchymal stem cell and extra cellular matrix scaffold device, will lead to improved standards of care for patients suffering from chronic myocardial infarction who are thus at risk of developing HF. By not only retarding disease progression but by actually restoring cardiac function, we believe that the proposed project will have a tremendous impact on both the cost of care as well as the quality of life for large groups of Californians and patients worldwide for whom the improbable prospect of heart transplantation is the only curative treatment option available.

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